value and a small value (less than the large value) depending on whether or not an object in the prescribed short range is detected as a result of the immediately-preceding preliminary emission. Specifically, the width of a pulse of the laser light generated by a main emission is equal to the large value in the case where an object in the prescribed short range is not detected as a result of the immediately-preceding preliminary emission. On the other hand, the width of a pulse of the laser light generated by a main emission is equal to the small value in the case where an object in the prescribed short range is detected as a result of the immediately-preceding preliminary emission. The small-width pulse of the laser light less adversely affects human eyes.

Fifth Embodiment

A fifth embodiment of this invention is similar to the fourth embodiment thereof except for design changes mentioned hereafter. According to the fifth embodiment of this invention, a decision step similar to the step 130 (see Fig. 3) replaces the steps 125 and 131 (see Fig. 7). The decision step determines whether or not the comparator 35 (see Fig. 1) outputs a high-level decision signal during a time interval corresponding to the low-power measurable distance. In the case where the comparator 35 outputs a high-level decision signal, that is, in the case where an object is detected, the program advances from the decision step to the step 135 (see Fig. 7). On the other hand, in the case where the comparator 35 does not output a high-level decision signal, that is, in the case where an object is not detected, the program advances

from the decision step to the step 133 (see Fig. 7).

Sixth Embodiment

A sixth embodiment of this invention is similar to one of the first to fifth embodiments thereof except for design changes mentioned hereafter. With reference to Fig. 9, the sixth embodiment of this invention replaces every main emission of the laser light with a main emission procedure which produces either one pulse or a plurality of pulses.

According to the sixth embodiment of this invention, a plurality of pulses (for example, four pulses) of the laser light are sequentially generated by a main emission procedure in the case where an object is not detected as a result of the immediately-preceding preliminary emission. On the other hand, one pulse of the laser light is generated by a main emission procedure in the case where an object is detected as a result of the immediately-preceding preliminary emission.

Seventh Embodiment

A seventh embodiment of this invention is similar to one of the first to fifth embodiments thereof except for design changes mentioned hereafter. The seventh embodiment of this invention replaces every main emission of the laser light with a main emission procedure which produces a plurality of pulses.

In the seventh embodiment of this invention, a signal generation circuit 40 (see Fig. 1) produces one of a transmission signal having only one pulse for a preliminary emission, a transmission signal of a P-bit pseudo noise code for a main emission

procedure, and a transmission signal of a Q-bit pseudo noise code for a main emission procedure, where "P" denotes a predetermined natural number and "Q" denotes a predetermined natural number smaller than the predetermined natural number "P". The transmission signal of the P-bit pseudo noise code has a sequence of pulses. Similarly, the transmission signal of the Q-bit pseudo noise code has a sequence of pulses. For example, the P-bit pseudo noise code and the Q-bit pseudo noise code are a 127-chip maximum length code and a 15-chip maximum length code respectively. The forward laser beam transmitted from a light emitting portion 10 (see Fig. 1) is modulated in accordance with the transmission signal outputted from the signal generation circuit 40.

In the seventh embodiment of this invention, a time measurement circuit 50 (see Fig. 1) calculates a correlation between the transmission signal and an echo signal outputted from a light receiving portion 20 (see Fig. 1). The time measurement circuit 50 detects a timing at which the calculated correlation peaks. The time measurement circuit 50 informs a microcomputer 90 (see Fig. 1) of the detected timing. The microcomputer 90 calculates the distance to a detected object from the subject vehicle on the basis of the detected timing.

According to the seventh embodiment of this invention, one pulse of the laser light is generated by a preliminary emission. With reference to Fig. 10, the transmission signal of the P-bit pseudo noise code (for example, the 127-chip maximum length code) is outputted from the signal generation circuit 40 and hence a